



**STATE OF NEW JERSEY**  
**Board of Public Utilities**  
**Two Gateway Center**  
**Newark, NJ 07102**  
**[www.nj.gov/bpu/](http://www.nj.gov/bpu/)**

**CLEAN ENERGY**

IN THE MATTER OF THE CLEAN ENERGY  
MANUFACTURING FUND SOLICITATION – AWARD  
RECOMMENDATION

) ORDER ON SECOND  
) SOLICITATION  
)

) DOCKET NO. EO09120966  
) EO09120967

Darrel Hammell, EVP, Business Development, Princeton Power Systems, Inc., 201 Washington Road, Building #2, Princeton, NJ 08540

Paul MacMillan, CEO/Founder, AppliCAD, Inc., 5029 Industrial Road, Farmingdale, NJ 07727

James E. McGuire, Esq. Deputy Attorney General, for the Staff of the New Jersey Board of Public Utilities

**BY THE BOARD:**

This Order memorializes actions taken by the New Jersey Board of Public Utilities ("Board") at its December 16, 2009 Agenda Meeting in approving an award of \$3.3 million in assistance to Princeton Power Systems, Inc. ("PPS") and \$982,000 in assistance to AppliCAD, Inc. ("AI") pursuant to the second public competitive solicitation ("Solicitation") for the Edison Innovation Clean Energy Manufacturing Fund ("CEMF").

**BACKGROUND**

At its May 14, 2009 Agenda meeting, the Board voted to approve the second solicitation to be issued under the CEMF program ("Program"). On June 1, 2009 the Board's Office of Clean Energy ("OCE" or "Staff"), in collaboration with the New Jersey Economic Development Authority ("EDA") as administrator of the CEMF, issued the Solicitation for the CEMF Program. The Solicitation offered financial assistance in the form of zero interest loans and grants to support Class I renewable energy or energy efficiency companies entering or expanding their manufacturing operations in New Jersey. Eligible applicants were companies that currently do,



or within 36 months plan to, manufacture Class I renewable energy or energy efficiency systems, products or technologies in New Jersey.

The total funds that can be awarded under the Program include up to 50% of total project's budgeted costs, not to exceed \$3.3 million per project for each solicitation under the Program. This program requires a firm commitment of a 50% cash match of total project budgeted costs from other sources of funding for cost sharing, either from non-State grants, loans, or equity. The Program offers funding in the form of a grant for facility site assessment, procurement, and design, the amount of the grant not to exceed 10% of total CEMF funds requested by the applicant and capped at \$300,000 ("Tranche I"). The Program also offers a ten-year zero interest loan for site improvements, equipment purchases, and facility construction and operation ("Tranche II"). The amount of the loan is not to exceed \$3,000,000. At the closing of the grant, twenty percent (20%) of the Tranche I approved funds will be advanced for upfront "seed money" with the remainder paid after work has been completed upon submission of invoices. Equal monthly repayments of the zero interest loan start in the fourth year after documentation closing on the loan for a seven-year term, with the Board taking a lien on assets subordinate to any existing senior debt. Up to 33% of the loan amount disbursed may be converted to a performance grant if business and technology based milestones are met during the first 3 years as agreed to prior to closing.

The Board has established the budgetary levels for the energy efficiency and renewable energy programs, including the CEMF, in the New Jersey Clean Energy Program ("NJCEP") 2009 Programs and Budget Compliance Filings Order in Docket No. EO07030203, dated January 8, 2009 ("January 8, 2009 Order"). In its January 8, 2009 Order, the Board approved funding of \$23,928,000, comprised of new and carryover funds, to the CEMF, these funds to be held by the EDA to finance non-interest bearing loans and grants.

The Solicitation was open to applicants from June 1, 2009 to July, 15, 2009. EDA received thirty two (32) Initial Eligibility Intake Forms, of which twenty four (24) met the eligibility requirements and were requested to submit full applications by August 14, 2009. Of those 24 eligible applicants, seventeen (17) submitted full applications to EDA and from these 17 applications eight (8) were selected, based on a dual review process by the EDA for business viability and the BPU for technical criteria to be presented to the Clean Technology Evaluation Committee ("CTEC"). The CTEC is an inter-agency body responsible for the technical evaluations of the 8 proposals and the recommendation of any proposals it deems meritorious for underwriting analysis and due diligence to be conducted by the EDA.

On September 14, 2009, the CTEC met to review the applications of the 8 finalists. The CTEC scored applications based upon the Program's evaluation criteria set forth in the Solicitation and recommended five (5) applications for underwriting analysis and due diligence review by the EDA.

The EDA on October 15, 2009 after completing their underwriting review recommended approval of the \$3.3 million in CEMF financial assistance for Noveda Technologies, Inc. The BPU approved the award at their October 28, 2009 agenda meeting.

On December 2, 2009, EDA completed the underwriting review of PPS' and AI's projects since they provided all of the requested information necessary for EDA to complete its underwriting



analysis. The applications of the remaining two entities recommended for further review by the CTEC are still undergoing EDA's underwriting review.

### **The AppliCAD Project**

AI states it will cost \$1,964,000 to establish its LGate manufacturing line which consists primarily of purchasing inventory (\$672,000) and equipment (\$950,000). The company is seeking a \$97,000 CEMF grant and an (\$855,000) CEMF loan. AI entered into a contract with Locus Energy and will be responsible for the hardware manufacturing, testing and distribution. Locus will be responsible for software development and all other aspects of the sales cycle.

- The proposed product is a web-based performance monitoring and optimization platform for integrators of distributed energy systems designed to collect and analyze performance data for performance optimization in real time. The system identifies underperforming solar centers, which should result in transparency to ratepayers thru the accurate measurements of energy production.
- AI operated from a 20,000 square-foot facility in Farmingdale, NJ with 28 full-time employees and 12 part-time employees and projects that it will add 10 new employees within two years. The proposed financing will enable the company to increase its manufacturing capacity from 400 units per month to a projected 2,000 units per month.

### **The Princeton Power System Project**

The business growth supported by PPS's proposed project includes both the development and production of the hardware described below as well as full system installations enabled by that hardware.

- PPS is a manufacturer of grid-tied inverter called GTIB 480-100. The inverter is used for commercial distributed generation applications.
- PPS is also developing a second-generation grid-tied inverter called the Demand Response Inverter (DRI) that incorporates additional "smart grid" communication and control features for commercial application.
- PPS also manufactures advanced military-grade power suppliers for the US Navy and Army energy applications.
- PPS reported that it had 22 employees at the time of its application and project that it will have 91 within two years.

The project involves development of a new manufacturing facility in West Windsor, NJ which will be used to manufacture the PPS Grid-tied Inverter product line. The project will enable PPS to expand from its current manufacturing capacity of 4.5 MW of its Grid-tied inverter device to projected capacity of 21.5 MW annually within two years.

Board Staff and the Division of Law have reviewed the CTEC Report, with its recommendation that 5 applicants receive further review and that the EDA proceed with an underwriting review of PPS and AI. The CTEC Report contains a competitive assessment of the projects. For each applicant, a completed underwriting review and recommendation from EDA is a necessary component of the Board's review.



Board Staff and the Division of Law have also reviewed the EDA's recommendation that PPS be awarded funding in the amount of \$3.3 million and AI be awarded \$982,000. PPS and AI are the second and third of the five projects for which the EDA has completed its underwriting review at this time. On the basis of the CTEC Report and the EDA's subsequent underwriting review and recommendation, Staff recommends that the Board approve a \$300,000 Grant and \$3.0 million Loan from the CEMF to PPS and a \$97,000 grant and an \$885,000 loan from the CEMF to AI, consistent with EDA's recommendation

## **DISCUSSION AND FINDING**

The CEMF Program supports manufacturing of energy efficient and renewable energy products that will assist Class I renewable energy technologies in becoming competitive with traditional sources of electric generation. This support is consistent with the energy and environmental goals of the Energy Master Plan<sup>1</sup> issued in October 2008, the Regional Greenhouse Gas Initiative ("RGGI"), P.L. 2007, c.340, and the Global Warming Response Act, P.L. 2007, c.112, ("GWRA"). The Energy Master Plan calls for 30% of New Jersey's electricity needs to be supplied through renewable sources by 2020 and for 20% reduction of projected electricity and heating consumption by 2020. Other expected benefits of the Program include increasing the number of green jobs in New Jersey by encouraging expansion of current manufacturers and providing sufficient incentives for other manufacturers to locate in New Jersey; stimulating economic development in the New Jersey's renewable energy and energy efficiency sector through demand for goods and services by manufacturers; and increasing the volume of renewable energy and energy efficient products manufactured in New Jersey and sold to New Jersey consumers. Finally, the Program will ultimately benefit New Jersey's ratepayers by providing long-term energy needs and solutions in an environmentally sound manner.

With reference to the stimulation of economic development in New Jersey, the Board notes that AI and PPS are New Jersey-based companies. In addition, the companies have plans to expand its workforce and production capacity during 2010 and 2011. These additional benefits are in line with the goals and purposes of the CEMF Program.

Upon consideration of the facts set forth above, the Board **FINDS** that the second public competitive Solicitation for the CEMF was issued on June 1, 2009. The Board **FURTHER FINDS** that the CTEC reviewed applications from eligible applicants as consistent with the stated evaluation criteria set forth in the Solicitation and selected AI and PPS as two of the entities to be recommended for an award. The Board **FURTHER FINDS** that the Board accepted the CTEC Report at its October 28, 2009 agenda meeting. The Board **FINDS** that EDA conducted an underwriting review of Princeton Power Systems' application and recommended a Grant of \$300,000 and a Loan of \$3.0 million. In addition the Board also **FINDS** that EDA conducted an underwriting review of AppliCAD's application and recommended a Grant of \$97,000 and a Loan of \$885,000. The Board **FINDS** that an award of \$3.3 million to PPS and an award of \$928,000 to AI is appropriate and a proper expenditure of ratepayers' funds.

Now, therefore, the Board **HEREBY APPROVES** a Grant of \$300,000 and Loan of \$3.0 million to PPS and a Grant of \$97,000 and an Loan of \$885,000 to AI in accordance with relevant terms and conditions herein and the recommendation issued by the EDA. The Board **ORDERS** that commitment letters, consistent with the terms of this Order, be issued to PPS and AI by the


---

<sup>1</sup> The EMP is available at <http://www.nj.gov/emp/docs>.

Board's OCE Director in coordination with appropriate EDA staff. The Board also **AUTHORIZES** President Fox to sign the Grant and Loan Funding Agreements, the form of which was previously approved by the Board on March 12, 2009 in Docket No. EO08070470, as consistent with the terms of this Order and the Department of Treasury requirements.

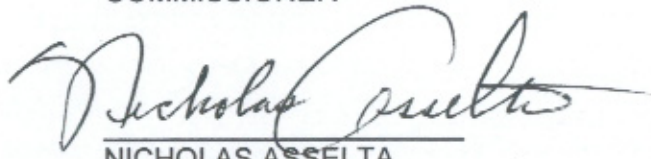
DATED: 12-17-09

BOARD OF PUBLIC UTILITIES  
BY:

  
JEANNE M. FOX  
PRESIDENT

  
FREDERICK F. BUTLER  
COMMISSIONER

  
JOSEPH L. FIORDALISO  
COMMISSIONER

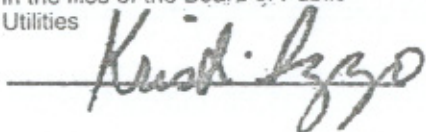
  
NICHOLAS ASSELTA  
COMMISSIONER

  
ELIZABETH RANDALL  
COMMISSIONER

ATTEST:

KRISTI IZZO  
SECRETARY

I HEREBY CERTIFY that the within  
document is a true copy of the original  
in the files of the Board of Public  
Utilities





**NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY  
PROJECT SUMMARY - CLEAN ENERGY MANUFACTURING FUND GRANT**

**APPLICANT:** AppliCAD, Inc.

P28562

**PROJECT USER(S):** Same as applicant

\* - indicates relation to applicant

**PROJECT LOCATION:** 5029 Industrial Road

Farmingdale Borough (N)

Monmouth

**GOVERNOR'S INITIATIVES:**

( ) Urban Fund ( ) Other Urban (X) Edison ( ) Core (X) Clean Energy

**APPLICANT BACKGROUND:**

AppliCAD, Inc. ("AI") was formed in 1989 as a provider of printed circuit designs by the current owner, Paul MacMillan. Currently, the company provides a variety of services including engineering, CAD training and electronic product design/development. In addition, AI provides light manufacturing services and specializes in quick-turn prototyping with low to medium volume production runs for all types of printed circuits. The company is a member of IPC (The Institute for Interconnecting and Packaging Electronic Circuits) and SMTA (Surface Mount Technology Association). AI operates from a 20,000 square-foot facility in Farmingdale, NJ with 28 full-time employees and 12 part-time employees.

AI has recently entered into a two-year agreement with Locus Energy to manufacture its line of "LGate" power meters. The LGate is a web-based performance monitoring and optimization service for integrators of distributed energy systems. The service is provided through a scalable web-based platform which links remotely to on-site data logging hardware that enables performance data to be collected and analyzed for performance optimization in real-time.

AI stated that it will cost \$1,964,000 to establish its LGate manufacturing line, which consists primarily of purchasing inventory (\$672,000) and equipment (\$950,000). The company is seeking a \$97,000 CEMF grant and an \$885,000 CEMF loan.

**APPROVAL REQUEST:**

Approval is requested for a \$97,000 grant as proposed.

**FINANCING SUMMARY:**

**GRANTOR:** BPU - Tranche I

**AMOUNT OF GRANT**\$97,000

**TERMS OF GRANT:** Grant. No repayment required.

**PROJECT COSTS:**

Purchase of equipment & machinery	\$950,000
Inventory	\$672,000
Working capital	\$342,000
<b>TOTAL COSTS</b>	<b>\$1,964,000 *</b>

\* - Indicates that there are project costs reported on a related application.

**JOBS:** At Application    28 Within 2 years    10 Maintained    28 Construction    0

**DEVELOPMENT OFFICER:** P. Durand

**APPROVAL OFFICER:** S. Brady

**NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY**  
**PROJECT SUMMARY - CLEAN ENERGY MANUFACTURING FUND PROGRAM**

**APPLICANT:** AppliCAD, Inc.

P28437

**PROJECT USER(S):** Same as applicant

\* - indicates relation to applicant

**PROJECT LOCATION:** 5029 Industrial Road

Farmingdale Borough (N)

Monmouth

**GOVERNOR'S INITIATIVES:**

( ) Urban Fund ( ) Other Urban (X) Edison ( ) Core (X) Clean Energy

**APPLICANT BACKGROUND:**

AppliCAD, Inc. ("AI") was formed in 1989 as a provider of printed circuit designs by the current owner, Paul MacMillan. Currently, the company provides a variety of services including engineering, CAD training and electronic product design/development. In addition, AI provides light manufacturing services and specializes in quick-turn prototyping with low to medium volume production runs for all types of printed circuits. The company is a member of IPC (The Institute for Interconnecting and Packaging Electronic Circuits) and SMTA (Surface Mount Technology Association). AI operates from a 20,000 square-foot facility in Farmingdale, NJ with 28 full-time employees and 12 part-time employees.

AI has recently entered into a two-year agreement with Locus Energy to manufacture its line of "LGate" power meters. The LGate is a web-based performance monitoring and optimization service for integrators of distributed energy systems. The service is provided through a scalable web-based platform which links remotely to on-site data logging hardware that enables performance data to be collected and analyzed for performance optimization in real-time.

AI stated that it will cost \$1,964,000 to establish its LGate manufacturing line, which consists primarily of purchasing inventory (\$672,000) and equipment (\$950,000). The company is seeking a \$97,000 CEMF grant and an \$885,000 CEMF loan.

**APPROVAL REQUEST:**

Approval is requested for a \$885,000 loan as proposed.

**FINANCING SUMMARY:**

**GRANTOR:** BPU - Tranche II

**AMOUNT OF GRANT:** \$885,000

**TERMS OF GRANT:** 0% interest. Up to 33% of the amount disbursed may be converted to a performance grant if business and technology based milestones are met during the first 3 years as agreed prior to closing. Equal monthly payments to commence 37 months from closing for a period of seven years (fully amortizing by maturity).

**PROJECT COSTS:**

**TOTAL COSTS**

\$0 \*

\* - Indicates that there are project costs reported on a related application.

<b>JOBS:</b> At Application	<u>0</u>	Within 2 years	<u>0</u>	Maintained	<u>0</u>	Construction	<u>0</u>
Jobs on Related 28562	<u>28</u>		<u>10</u>		<u>28</u>		<u>0</u>

**DEVELOPMENT OFFICER:** P. Bagga

**APPROVAL OFFICER:** S. Brady



**NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY  
EDISON INNOVATION CLEAN ENERGY MANUFACTURING**

December 2, 2009

Re: AppliCAD, Inc. or Nominee  
5029 Industrial Road  
Farmingdale, NJ 07727

**PROGRAM and STRUCTURE**

New Jersey Board of Public Utilities (BPU) Office of Clean Energy and the New Jersey Economic Development Authority (EDA) as administrator of the Edison Innovation Clean Energy Manufacturing Fund ("CEMF") is proposing the following assistance to AppliCAD, Inc.'s ("AI") Class 1 renewable energy expansion into the manufacturing stage of commercial development. The project has a total cost of \$1,964,000 which will be funded with \$982,000 of equity and the proposed \$982,000 of CEMF funding. This request was received in response to the June 2009 public competitive solicitation. The solicitation was previously approved by the BPU commissioners.

Amount Requested:	Tranche 1] \$97,000 and Tranche 2] \$885,000
Term and Interest Rate:	1] grant with no repayment or interest 2] loan with no interest, up to 33% of the amount disbursed may be converted to a performance grant if business and technology based milestones are met during the first 3 years as agreed prior to closing. Equal monthly payments to commence 37 months from closing for a period of seven years (fully amortizing by maturity).
Collateral:	First purchase money lien on equipment being purchased and a second blanket lien on all business assets. Consent to future additional senior indebtedness of up to 25% of the \$982,000 CEMF funding commitment (this would result in BPU being in a subordinated position on the applicant's assets).
Purpose:	A] Tranche I is the planning phase, which will consist of design, project management costs and modification of the facility being utilized for the project. B] Tranche II is the full implementation of manufacturing facility which includes purchasing & installing capital equipment, hire and train assembly personnel and manufacturing engineers, inventory and test facilities all of which are associated with commencement of commercial operations.

Tranche 1] 20% advanced at closing with remainder paid after work completed and invoices presented.

Tranche 2] no more than 50% of the funds may be advanced prior to commercial production.



## DESCRIPTION OF COMPANY AND TECHNOLOGY

AppliCAD, Inc. ("AI") was formed in 1989 as a provider of printed circuit designs by the current majority shareholder (81.86%), Paul MacMillan. Mr. MacMillan's wife and three children account for the remaining ownership stakes. Currently, the company provides a variety of services including engineering, CAD training and electronic product design/development. In addition, AI provides light manufacturing services and specializes in quick-turn prototyping with low to medium volume production runs for all types of printed circuits. The company is a member of IPC (The Institute for Interconnecting and Packaging Electronic Circuits) and SMTA (Surface Mount Technology Association). AI operates from a 20,000 square-foot facility in Farmingdale, NJ with 28 full-time employees and 12 part-time employees. Of note, the proposed project will add 10 new employees within two years.

AI has recently entered into an agreement with Locus Energy ("Locus") to manufacture its line of "LGate" power meters (note, AI and Locus are not related companies). The agreement commenced on May 6, 2009 for a term of two years with the option for annual renewals thereafter. Locus Energy was formed in 2007 as a software developer for the renewable energy market. The LGate is its first product, which is a web-based performance monitoring and optimization platform for integrators of distributed energy systems. The platform consists of a hardwired meter in a solar panel system and web-based software that was designed to be scalable. The system enables performance data to be collected and analyzed for performance optimization in real-time. The benefits include the ability to identify underperforming solar centers, which should result in more efficient renewable energy generation. In addition, the real-time data will result in transparency to rate payers thru the accurate measurement of energy production. The meter is revenue grade and has received numerous certifications (ANSI C12.20, IEC 61010, FCC 15 Part B, IEC 60068-2-27, IEC 60068-2-6 and CFR 4 ANSI C63.4). AI will be responsible for the hardware manufacturing, testing and distribution; Locus will be responsible for software development and all other aspects of the sales cycle. As a software developer with no manufacturing experience, Locus decided it was prudent to outsource and AI was selected due to its proven track record with prototype manufacturing, small-scale production and its high quality control standards. The primary investor and Board Member of Locus stated that they have been very impressed with AI and believe that it is a strong partnership that will be maintained.

AI stated that it will cost \$1,964,000 to establish its LGate manufacturing line, which consists primarily of purchasing inventory (\$672,000) and equipment (\$950,000). The company is seeking a \$97,000 CEMF grant and an \$885,000 CEMF loan.

## MANAGEMENT TEAM

### APPLICAD

Paul MacMillan, CEO and Founder of AI (81.86% owner) – He received a Bachelor of Science degree in Biology from Baldwin-Wallace College. His prior experience includes serving as Vice President of Sales and Vice President of Operations for EWC Controls (which is now a customer of AI). In addition, Mr. MacMillan served as an Executive Officer in the Navy and was



honorably discharged in 1970. He formed AI in 1989 and has been actively involved in all aspects of the business. Mr. MacMillan is in the process of transitioning the company over to his son, John, who has been active at the company for more than 20 years. His other two children are also employed by the company.

John MacMillan, President of AI (5.6% ownership) - John began working for AI while still in high school, more than 20 years ago. Initially, he trained as an assembly technician and later served as a circuit board designer and applications engineer. Mr. MacMillan is certified by the IPC as a Certified Interconnect Designer (CID) and Advanced Certified Interconnect Designer (CID+). He was promoted to President in 2009 and is now actively involved in managing the daily operations of the company.

Christopher Gilbertson, Vice President of Operations of AI - He received a Bachelor of Arts degree in Managerial Economics from Marietta College. Mr. Gilbertson is responsible for managing process and quality control, inventory assembly and testing. His prior experience includes serving at Spirent Communications for 20 years in various roles including Operations Manager and Director of Quality Assurance. During his employment, the company grew from \$10 million to \$120 million in sales.

## **LOCUS**

Michael Herzig, President and Founder of Locus - He received a Bachelor of Arts degree from Cornell University. Prior to forming Locus, Mr. Herzig served as a Financial Consultant for Anderson Consulting/Accenture. In addition, he was Co-Founder of MPI Professionals which was a consulting company that provided strategy, sales, quality assurance, recruiting and human resources management services. The company grew from two employees to more than 100 before being purchased by CGI in 2005.

Asaf Peleg, Developer and Software Engineer at Locus - He received a Bachelor of Science degree in Economics and Computer Science from University of Maryland. Mr. Peleg is involved in all aspects of software development at Locus. In addition, he serves as a technical liaison for clients to ensure that the product is meeting their needs. His prior experience includes serving on the technology team at Starwood Hotels and Resorts Worldwide that was responsible for managing pricing and availability data for all company locations.

## **RECOMMENDATION**

Approval is recommended for \$982,000 in total financing from the Edison Innovation Clean Energy Manufacturing Fund as proposed.



**NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY  
PROJECT SUMMARY - CLEAN ENERGY MANUFACTURING FUND GRANT**

**APPLICANT:** Princeton Power Systems, Inc.

P28597

**PROJECT USER(S):** Same as applicant

\* - indicates relation to applicant

**PROJECT LOCATION:** 201 Washington Road

West Windsor Township (N)

Mercer

**GOVERNOR'S INITIATIVES:**

( ) Urban Fund ( ) Other Urban ( ) Edison ( ) Core (X) Clean Energy

**APPLICANT BACKGROUND:**

Princeton Power Systems is a manufacturer of a grid-tied inverter called the GTIB 480-100. The inverter is used for commercial distributed generation applications. PPS is also developing a second-generation grid-tied inverter called the Demand Response Inverter (DRI) that incorporates additional "smart grid" communications and control features for commercial applications. Finally, PPS manufactures advanced military-grade power supplies for the US Navy and US Army energy applications.

**APPROVAL REQUEST:**

\$300,000 grant from the Clean Energy Manufacturing Fund is recommended. This project is related to P28435 being simultaneously presented for approval for a \$3 million loan under the same funding source.

**FINANCING SUMMARY:**

**GRANTOR:** BPU: Tranche I

**AMOUNT OF GRANT:** \$300,000

**TERMS OF GRANT:** Grant, no interest or principal.

**PROJECT COSTS:**

Purchase of equipment & machinery	\$3,760,000
General and Admin	\$1,100,000
Direct labor/other	\$1,030,000
Installation costs	\$710,000
<b>TOTAL COSTS</b>	<b>\$6,600,000</b>

**JOBS:** At Application    22 Within 2 years    91 Maintained    0 Construction    0

**DEVELOPMENT OFFICER:** P. Durand

**APPROVAL OFFICER:** D. Lawyer



**NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY  
PROJECT SUMMARY - CLEAN ENERGY MANUFACTURING FUND PROGRAM**

**APPLICANT:** Princeton Power Systems, Inc.

P28435

**PROJECT USER(S):** Same as applicant

\* - indicates relation to applicant

**PROJECT LOCATION:** 201 Washington Road

West Windsor Township (N)

Mercer

**GOVERNOR'S INITIATIVES:**

( ) Urban Fund ( ) Other Urban ( ) Edison ( ) Core (X) Clean Energy

**APPLICANT BACKGROUND:**

Princeton Power Systems is a manufacturer of a grid-tied inverter called the GTIB 480-100. The inverter is used for commercial distributed generation applications. PPS is also developing a second-generation grid-tied inverter called the Demand Response Inverter (DRI) that incorporates additional "smart grid" communications and control features for commercial applications. Finally, PPS manufactures advanced military-grade power supplies for the US Navy and US Army energy applications.

**APPROVAL REQUEST:**

Approval is recommended for the \$3 million loan under the Clean Energy Manufacturing Fund. Project is related to P28597 being simultaneously presented for approval for a \$300,000 grant from a similar program.

**FINANCING SUMMARY:**

**GRANTOR:** BPU: Tranche 2

**AMOUNT OF GRANT:** \$3,000,000

**TERMS OF GRANT:** No interest, up to 33% of the amount disbursed of the \$3 million may be converted to a performance grant if business and technology based milestones are met during the first 3 years as agreed prior to closing. Equal monthly payments to commence 37 months from closing for a period of seven years (fully amortizing by maturity).

**PROJECT COSTS:**

**TOTAL COSTS**

\$0 \*

\* - Indicates that there are project costs reported on a related application.

<b>JOBS:</b> At Application	<u>0</u>	Within 2 years	<u>0</u>	Maintained	<u>0</u>	Construction	<u>0</u>
Jobs on Related 28597	<u>22</u>		<u>91</u>		<u>0</u>		<u>0</u>

**DEVELOPMENT OFFICER:** P. Durand

**APPROVAL OFFICER:** D. Lawyer

**NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY  
CLEAN ENERGY MANUFACTURING**

December 2, 2009

Re: Princeton Power Systems, Inc.  
201 Washington Road  
West Windsor, NJ 08550

**PROGRAM and STRUCTURE**

New Jersey Board of Public Utilities (BPU) Office of Clean Energy and the New Jersey Economic Development Authority (EDA) as administrator of the Edison Innovation Clean Energy Manufacturing Fund ("CEMF") is proposing the following assistance to Princeton Power Systems, Inc., ("PPS" or the "Company"). This project involves the development of a new manufacturing facility at 201 Washington Road, West Windsor, NJ. The facility will be used to manufacture PPS' PWM (pulse width modulation) Grid-tied Inverter product line. This request was received in response to the June 2009 public competitive solicitation. The solicitation was previously approved by the BPU commissioners.

Amount Requested:	Tranche 1: \$300,000	Tranche 2: \$3,000,000
Term and Interest Rate:	Tranche 1: Grant with no repayment or interest Tranche 2: Loan with no interest, up to 33% of the amount disbursed of the \$3 million may be converted to a performance grant if business and technology based milestones are met during the first 3 years as agreed prior to closing. Equal monthly payments to commence 37 months from closing for a period of seven years (fully amortizing by maturity).	
Collateral:	First lien on all business assets. Consent to future additional senior indebtedness of up to 25% of the \$3.3 million CEMF funding commitment (this would result in BPU being in a subordinated position on the applicant's assets).	
Purpose:	Both Tranche 1 and 2 proceeds will be used in the development of the manufacturing facility.	

Tranche 1: 20% advanced at closing with remainder paid after work completed and invoices presented.  
Tranche 2: A maximum of 50% the proceeds may be advanced prior to commercial production.

Each Tranche has up to 36 months to draw the funds from closing.

**DESCRIPTION OF COMPANY AND TECHNOLOGY**

Princeton Power Systems is a manufacturer of a grid-tied inverter called the GTIB 480-100. The inverter is used for commercial distributed generation applications. PPS is also developing a second-generation grid-tied inverter called the Demand Response Inverter (DRI) that incorporates additional "smart grid" communications and control features for commercial applications. Finally, PPS manufactures advanced military-grade power supplies for the US Navy and US Army energy applications. The business growth supported by the proposed project includes both the development and production of the hardware described below as well as full system installations enabled by that hardware.



GTIB 480-100: The GTIB 480-100 is a 100 kilowatt (kW) grid-tied inverter used to interconnect distributed generators with the electric grid. Its primary features include:

- 100 kW 3-phase 480 VAC, stackable to higher power levels
- Peak efficiency of 98.0%
- Based on military designs for high-reliability, 10-year life
- 280 - 600 VDC input range for solar arrays, batteries, etc.
- Wide Maximum Power Point Tracking range
- Transfer-switch for backup power and microgrid applications
- UL 1741 and IEEE 1547 compliant

The GTIB 480-100 is a versatile, efficient, reliable grid-tied inverter, compatible with DC power sources and AC generators of many types. The GTIB 480-100 enables bi-directional power flow and is capable of operating a "microgrid" when disconnected from utility power. It is also capable of operating pumping motors at variable speed, directly from a solar array or other power source. In solar applications, the GTIB 480-100 produces more power with advanced maximum power point tracking algorithms developed in conjunction with Princeton University. Programmable power curves for compatibility with most generators.

Demand Response Inverter: The Demand Response Inverter incorporates advanced communications, load control, and integration with energy storage to drastically reduce the levelized cost of energy (LCOE) of distributed solar generation. The DRI allows integration with building energy management systems, utility communications, and intelligent load control to make solar arrays dispatchable and predictable for utility grid operators. The DRI also allows time-of-use power shifting and load-leveling to reduce electric bills for system owners, all with significantly lower initial cost and longer lifetimes than traditional inverters.

The Demand Response Inverter is a 4-port device that includes an AC grid-tie port, AC load control port, DC solar port, and DC energy storage port, along with relays for smart load control and utility communications. The AC load port includes variable frequency and voltage output to control motor loads at variable speeds to provide demand reduction upon command.

The Demand Response Inverter is based on PPS' patented AC-link Technology, protected by two US patents and proprietary modeling and operational software code. It also includes innovations in materials technology including nanocrystalline transformer cores and high switching frequency controls. Both of these technologies have been developed and demonstrated for military power converter applications and will be first commercialized in the DRI. Prototype development is underway and testing will begin in the first quarter of 2010. The Demand Response Inverter will become an important part of the Company's grid-tied inverter product portfolio upon completion of development in late 2010.

Military-grade Motor Drives and Power Supplies: PPS has developed a 10 horsepower (hp) military-grade motor drive for shipboard applications, funded by Northrop-Grumman and Earl Industries. In August 2009, it became the first motor drive to meet the Navy's electromagnetic interference (EMI) and size and weight requirements, and PPS has entered into a development and distribution agreement with Earl Industries for 25 hp model. AC-link provides a clean power waveform, using a soft-switching method that significantly reduces switching transients and power distortion, this leading to lower EMI. The "AC-link" allows the use of a 99.8% efficient high-frequency nanocrystalline-core transformer to provide voltage transformation and galvanic isolation, making the product much more compact and efficient than state-of-the-art converters.

AC-link is also in prototype development for the Army's Ht-Power program, where a demonstration 30 kW microgrid converter will be demonstrated at Ft. Belvoir in November 2009, potentially leading to significant products sales and deployment.



## MANAGEMENT TEAM

Dr. Marshall J. Cohen, President & CEO: Dr. Cohen holds a Ph.D. in solid state physics from the University of Pennsylvania and a B.S. in physics from the University of Michigan. While at the University of Pennsylvania, he participated in pioneering work on electrically conducting polymers for which his thesis advisor was later awarded the Nobel Prize.

In 1991, Dr. Cohen co-founded Sensors Unlimited, Inc., the world's leading manufacturer of indium gallium arsenide devices, and was named President and CEO in 2004. He has authored over 40 scientific publications, holds six U.S. patents, and has directed over 50 government-supported R&D programs. Dr. Cohen became the President and CEO of PPS in April 2009.

Darren Hammell, Executive Vice President, Business Development (7% owner): Mr. Hammell graduated with honors from Princeton University with a B.S.E. in Computer Science. After winning first place in the 2001 Princeton University Business Plan Contest, he co-founded Princeton Power Systems. Mr. Hammell served as President and CEO from the founding until April 2009, when he became Executive Vice President of Business Development. He was named one of Red Herring Magazine's "Young Moguls" in 2005 and NJ-BIZ's "Forty Under 40" business leaders in New Jersey the same year. He is a member of the State of New Jersey's Clean Energy/Clean Technology Industry Workforce Advisory Council and a Founding Trustee of the non-profit New Jersey Solar Industry Manufacturer's Association.

Stephen Blake, PE, Chief Operating Officer, Executive Vice President, Engineering (3% owner): Mr. Blake received a M.S. degree in Mechanical Engineering from Rensselaer Polytechnic Institute and completed his undergraduate studies in Mechanical and Industrial Engineering at Clarkson University. Before joining PPS in April 2009 as Chief Operating Officer, Mr. Blake held various leadership positions while working for General Electric Energy, Lockheed Martin Space Operations, Honeywell, and Avaya. Mr. Blake's career began at the Kennedy Space Center, assigned to the US Space Shuttle program as a launch and recovery team member for 49 shuttle missions. During his time with the US Space Shuttle Program, he was assigned to various special teams and received multiple Shuttle launch processing awards. While with General Electric, Stephen obtained Six Sigma Black Belt Certification. Mr. Blake has led several product development and commercialization programs, and has been involved in integrating and leading acquisitions and successfully converting R&D operations to commercial operations in energy and engineered material industries.

Erik Limpaecher, Director of Research and Development (14% owner): Mr. Limpaecher graduated with honors from Princeton University with a B.S.E. in Electrical Engineering and a Certificate in Finance. After winning first place in the 2001 Princeton University Business Plan Contest, he co-founded Princeton Power Systems out of his senior year dorm room. Mr. Limpaecher designed the first control systems for the AC-link technology and has been the principal controls design architect for every existing AC-link system since the technology's inception. He has authored one U.S. patent, 15 technical papers, and has been the Principal Investigator or Program Manager for 20 government and private development programs. Mr. Limpaecher is a member of IEEE.

Cynthia Rosen, MBA, Director of Finance and Administration: Mrs. Rosen graduated with a BA in Economics from Rutgers University and an M.B.A. in Accounting from Seton Hall University. After working several years in the accounting field as a consultant and owner of her own company, Mrs. Rosen joined Princeton Power Systems as the Director of Finance and Administration.



## Board Members

Dr. Ed Zschau, Chairman of the Board: Mr. Zschau has a very broad background of experience which includes Senior Executive positions in technology based companies, education, venture capital, and politics. For instance, from 1983 through 1993, Mr. Zschau was the Chairman of the Board and CEO of Censtor Corporation, a developer of rigid disk media and thin film magnetic recording heads. He was also founder and CEO of System Industries, Inc., a Silicon Valley computer products company between 1968 and 1982. In respect to education, Mr. Zschau is currently a Visiting Lecturer with rank of Professor at Princeton University in the departments of Electrical Engineering and Operations Research and Financial Engineering and in the Center for Innovation in Engineering Education. From 1997 through 2000, he was also a Professor of Management at Harvard University. Finally, Mr. Zschau was elected to the US House of Representative in 1982 and served two terms. Mr. Zschau was also a member of the House Foreign Affairs Committee and Chairman of the House Republican Task Force on High Technology Initiatives.

Mr. Zschau earned a PhD in Business Administration, M.S. in Statistics, and MBA from Harvard University. He also has an A.B. in Philosophy from Princeton University.

Dr. Greg Olsen, Director: In addition to leading each of PPS' three financing rounds, Mr. Olsen has taken an active role in advising the team and sits on the Board of Directors. Mr. Olsen has started and sold two successful companies.

Dr. Joe Stach, Director: Dr. Stach is an investor and Director of PPS. Mr. Stach was the Executive Director of the Massachusetts Technology Park until 1987, Director of the Center of Microelectronics Research at the University of South Florida, and the CEO of RF Power, Inc. in Voorhees, NJ, until he sold the company to Advanced Energy, Inc., in 1998.

Dr. Rudy Limpaecher, Director: Dr. Limpaecher is the inventor of the AC-link technology. Mr. Limpaecher has over 30 years of experience with power systems, including a PhD in plasma physics from UCLA. Mr. Limpaecher is also an active consultant on projects for the company.

Dr. Chris Dries, Director: Dr. Dries received his PhD and MA degrees in Electrical Engineering from Princeton University, and joined the R&D Department at Sensors Unlimited where he became Vice President for Research and Development and was responsible for all funded research, contracts, and new product development.

## RECOMMENDATION

Approval is recommended for \$3.3 million in Edison Innovation Clean Energy Manufacturing Fund assistance.